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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/11/2001

Gang Huang

Huang 12

9461

7590

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EXAMINER

FAN, CHIEH M

ART UNIT

PAPER NUMBER

2634

DATE MAILED: 03/30/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/975,682

Applicant(s)

HUANG, GANG

Examiner

Chieh M Fan

Art Unit

2634

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11 October 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-23 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-23 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 01 October 2002 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Drawings

1. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: 400 (see page 12, line 5) and 500 (page 15, line 3). Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

2. The disclosure is objected to because of the following informalities:
"[c₀(n),c₁(n),,c₂(n)]" in line 7 of page 17 should be changed to --- [c₀(n),c₁(n),c₂(n)] ---. ;
"at t he" in line 8 and in line 21 of page 17 should be changed to --- at the ---.

Appropriate correction is required.

Claim Objections

3. Claims 1-13, 16, 17 and 23 are objected to because of the following informalities:

Regarding claim 1, it is suggested changing "said method comprising" in line 3 to --- said method comprising the steps of --- so as to provide antecedent basis for the children claims, e.g. see "said step of adapting" in line 1 of claim 7. Further, "said at least one precoding matrices" in lines 5-6 and in line 10 should be changed to --- said at least one precoding matrix --- so as to be consistent with the same limitation recited in lines 4-5.

Regarding claim 6, "comprising" in line 1 should be changed to --- comprising the step of ---; "said channel impairment" should be changed to --- said channel impairments ---; "said step of selecting initial parameters" should be changed to --- the step of selecting initial parameters --- since the exact term "step of selecting initial parameters" has not been recited before in the claim; and "a channel impairment" in line 15 should be changed to --- the channel impairments ---.

Regarding claim 11, "a channel impairment" in line 15 should be changed to --- the channel impairments ---.

Regarding claim 16, "said of in-phase" in line 1 should be changed to --- said at least one set of in-phase ---.

Regarding claim 17, "said of in-phase" in line 1 should be changed to --- said at least one set of in-phase ---.

Art Unit: 2634

Regarding claim 23, "said at least one precoding matrices" in lines 5-6 and in line 10 should be changed to --- said at least one precoding matrix --- so as to be consistent with the same limitation recited in lines 4-5.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5. Claim 19 is rejected under 35 U.S.C. 112, first paragraph, as being a single means claim since the claim only recites a transmitter. See MPEP 2164.08 (a).

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claims 7 and 14-22 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 7 recites the limitation "said at least one set of " in line 2. There is insufficient antecedent basis for this limitation in the claim.

Regarding claim 14, it is not clear which signals are the claimed transmitted and received signals in step (c), especially the received signals. Claim appears to be incomplete for omitting essential steps, such omission amounting to a gap between the steps.

Claim 19 recites the limitation "said precoder function" in lines 4-5. There is insufficient antecedent basis for this limitation in the claim.

Claim 21 recites the limitation "respective transmission channels" in line 3. There is insufficient antecedent basis for this limitation in the claim since only one transmission channel is recited in the parent claims.

Claim 22 recites the limitations "each of said at least one pre-coding matrices" in line 7 and "said first pre-coded signal" in line 9. There is insufficient antecedent basis for these limitations in the claim.

Claim Rejections - 35 USC § 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Art Unit: 2634

9. Claims 19 and 20 are rejected under 35 U.S.C. 102(e) as being anticipated by Ginis et al. (US 2003/0086514, "Ginis" hereinafter).

Regarding claim 19, Ginis teaches an apparatus, comprising: a transmitter, for adapting an encoded data signal (tone 1 in Fig. 14) according to at least one pre-coded signal (outputs of precoder 2 through precoder L in Fig. 14), said at least one pre-coded signal being determined with respect to encoded signals (tone 2 through tone L in Fig. 4) from at least one other transmitter, said pre-coder function adapting said encoded signal in response to a pre-coded matrix (1420-1 through 1420-L) to produce a pre-coded encoded signal.

Regarding claim 20, wherein said transmitter further comprises a filtering function (1410-1 in Fig. 14), for adapting said pre-coded encoded signal to a transmission channel (1430 in Fig. 14), said transmission channel tending to impair signals transmitted therethrough (paragraph 0008, the last three lines).

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. Claims 1-3, 6, 8-13, and 21-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ginis et al. (US 2003/0086514, "Ginis" hereinafter) in view of Schneider et al. (U.S. Patent No. 6,314,135, "Schneider" hereinafter).

Regarding claims 1 and 23, Ginis teaches a method for reducing cross-talk in a communications system comprising a plurality of transmitters (1410-1 through 1410-L in Fig. 14) for transmitting encoded data signals via respective communications channels, said method comprising the steps of: processing a first encoded data signal (tone 1 in Fig. 14) according to at least one pre-coding matrix (1420-1 through 1420-L) to produce a first pre-coded signal, each of said at least one pre-coding matrices having associated with it a respective encoded data signal (tone 2 through tone L); and communicating said first pre-coded signal to a respective first communication channel (1430 in Fig. 14), wherein said processing tending to offset channel impairments within said first communications channel (paragraph 0124, lines 5-8). Ginis does not particularly teach the step of adapting said at least one pre-coding matrix in response to an impairment indicative signal. Schneider teaches the step of adapting said at least one pre-coding matrix in response to an impairment indicative signal (lines 8-10 in abstract; also see 450-140-210 in Fig. 4) to compensate time-varying changes in the channel impairments (col. 1, lines 13-15). There, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to incorporate the step of "adapting said at least one pre-coding matrix in response to an impairment indicative signal" into the method of Ginis so as to compensate time-varying changes in the channel impairments.

Regarding claim 2, Schneider teaches receiving said first pre-coded signal from said first communications channel; (430 in Fig. 4) and generating said impairment indicative signal (output of 450 in Fig. 4) in response to a determination of a channel impairment level (462, 463 in Fig. 4) of said first communications channel.

Regarding claim 3, Schneider teaches the impairment indicative signal is determined according to a LMS algorithm (col. 5, line 66).

Regarding claim 6, Ginis teaches that the precoder may be initialized using a training mode (paragraph 0124, the last three lines). Schneider teaches that a initial training mode comprises the steps of propagating a pre-defined training sequence via said first communications channel; receiving said pre-defined training sequence from said first communications channel; and determining, using said received pre-defined training sequence, a channel impairment of said first communications channel (col. 1, lines 46-53; also see 273, 248, 246, 140 in Fig. 2).

Regarding claim 8, Ginis in view of Scineder teaches N transmitters, comprises N transmitters, where N is an integer, each of said N transmitters performing said steps of processing, communicating and adapting using respective encoded data signals (1410-1 through 1410-L and 1420-1 through 1420-L in Fig. 14 of Ginis).

Regarding claim 9, each of the N transmitters processes an encoded data signal according to N-1 pre-coding matrices (1420-2 through 1420-L in Fig. 14 of Ginis), each of said N-1 pre-coding matrices being associated with a respective encoded data signal (tone 2 through tone L in Fig. 14 of Ginis) from the other transmitters.

Regarding claim 10, said N transmitters processes an encoded data signal according to N pre-coding matrices (1420-1 through 1420-L in Fig. 14 of Ginis), each of said N pre-coding matrices being associated with a respective encoded data signal (tone 1 through tone L in Fig. 14 of Ginis) from each of the N transmitters.

Regarding claim 11, Ginis teaches that the precoder may be initialized using a training mode (paragraph 0124, the last three lines). Schneider teaches that a initial training mode comprises the steps of propagating a pre-defined training sequence via said first communications channel; receiving said pre-defined training sequence from said first communications channel; and determining, using said received pre-defined training sequence, a channel impairment of said first communications channel (col. 1, lines 46-53; also see 273, 248, 246, 140 in Fig. 2).

Regarding claims 12 and 13, Schneider teaches the step of training an equalizer (246, 241 in Fig. 2) to reduce channel-specific impairments from said received pre-defined training sequence prior to selecting said initial matrix parameters.

Regarding claim 21, Ginis teaches the claimed invention as applied to claims 19 and 20 above including a plurality of receivers (1440-1 through 1440-L in Fig. 14) for receiving respective transmitted signals from respective transmission channels (1430 in Fig. 14), but does not particularly teach "each of the receivers determining an impairment level associated with a corresponding transmission channel and propagating impairment indicative data to a corresponding transmitter; said transmitters adapting respective pre-coder matrices in response to respective channel impairment indicative signals." Schneider teaches a step of adapting a precoder in response to an

Art Unit: 2634

impairment indicative signal (lines 8-10 in abstract; also see 450-140-210 in Fig. 4) to compensate time-varying changes in the channel impairments (col. 1, lines 13-15).

There, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to incorporate the step of "adapting a precoder in response to an impairment indicative signal" into each of the transmitter and receiver pairs (1410-1 and 1440-1 through 1440-L and 1440-L) in Ginis, so as to compensate time-varying changes in the channel impairments of the channel 1430.

Regarding claim 22, Ginis teaches an apparatus for reducing cross-talk in a communications system comprising a plurality of transmitters (1410-1 through 1410-L in Fig. 14) for transmitting encoded data signals (tone 1 through tone L in Fig. 14) via respective communications channels (1430 in Fig. 14), said apparatus comprising; a transmitter (1410-1 in Fig. 14) including a summer for adding a first encoded data signal (output of 1420-1 in Fig. 14) to at least one pre-coded data signal (outputs of 1420-2 through 1420-L in Fig. 14) to produce an output signal, said at least one pre-coded data signal determined according to a respective pre-coding matrix (1420-2 through 1420-L in Fig. 14), each of said at least one pre-coding matrices having associated with it a respective encoded data signal (tone 2 through tone L in Fig. 14); said transmitter communicating said first pre-coded signal to a respective first communication channel (1430 in Fig. 14). Ginis does not particularly teach said transmitter modifying said at least one pre-coding matrices in response to an impairment indicative signal in a manner tending to offset channel impairments experienced by said output signal within said first communications channel. Schneider teaches a step of adapting a precoder in

Art Unit: 2634

response to an impairment indicative signal (lines 8-10 in abstract; also see 450-140-210 in Fig. 4) to compensate time-varying changes in the channel impairments (col. 1, lines 13-15). There, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to incorporate the step of "modifying said at least one pre-coding matrices in response to an impairment indicative signal in a manner tending to offset channel impairments experienced by said output signal within said first communications channel" into the transmitter of Ginis, so as to compensate time-varying changes in the channel impairments of the channel 1430 and thereby improve the communication quality.

12. Claims 4 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ginis et al. (US 2003/0086514, "Ginis" hereinafter) in view of Schneider et al. (U.S. Patent No. 6,314,135, "Schneider" hereinafter) as applied to claim 1 above, and further in view of Timm et al. (U.S. Patent No. 6,055,268, "Timm" hereinafter).

Ginis in view of Schneider teaches the claimed invention as applied to claim 1 above including the method is applied to a DSL system (paragraph 0003 of Ginis), but does not particularly a CAP signal or QAM signal. However, it is well known in the art that a DSL system may use a CAP signal or QAM signal. Timm teach a DSL system may use DMT, QAM or Cap signals (col. 3, lines 61-62 and 66-67). It would have been obvious to a person of ordinary skill in the art at the time the invention was made to use a CAP signal or a QAM signal in the DSL system of Ginis in view of Schneider, since

Art Unit: 2634

the use of a CAP signal or a QAM signal in a DSL system involves only routine skill in the art.

13. Claims 14-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ginis et al. (US 2003/0086514, "Ginis" hereinafter) in view of Timm et al. (U.S. Patent No. 6,055,268, "Timm" hereinafter) and Smee et al. (U.S. Patent No. 6,400,761, "Smee" hereinafter).

Regarding claim 14, Ginis teaches a method for reducing cross-talk in a DSL communications system (paragraph 0003) comprising a plurality of communications channels (1430 in Fig. 14), each communications channel propagating a respective signal, said method comprising: (a) processing at least one signal (tone 1 in Fig. 14) according to a respective pre-coding matrix (1420-1 in Fig. 14) to produce respective pre-coded signal; (b) communicating said at least one pre-coded signal via a respective communication channel (1430 in Fig. 14). Ginis does not teach (i) the at least one signal comprises in-phase (I) and quadrature (Q) signals; and (ii) the steps of (c) receiving, for each communicated pre-coded signal, data indicative of differences between transmitted and received signals; (d) adapting respective pre-coding matrices in response to respective received difference data; and (e) repeating steps (a) through (d) until said difference data associated with said at least one set of I and Q signals is less than a threshold difference level.

With respect to item (i), it is well known in the art that a DSL system may use a CAP signal or QAM signal (both have I and Q components). Timm teach a DSL system

Art Unit: 2634

may use DMT, QAM or Cap signals (col. 3, lines 61-62 and 66-67). It would have been obvious to a person of ordinary skill in the art at the time the invention was made to use a CAP signal or a QAM signal in the DSL system of Ginis, since the use of a CAP signal or a QAM signal in a DSL system involves only routine skill in the art.

With respect to item (ii), Smee teaches a method of compensating channel or system variations in order to improve performance of precoded communications system (col. 1, lines 12-15) comprising the step of (c) receiving, for each communicated pre-coded signal, data indicative of differences between transmitted and received signals (110 in Fig. 6, also see 46, 49 in Fig. 3); (d) adapting respective pre-coding matrices in response to respective received difference data (112 in Fig. 6); and (e) repeating steps (a) through (d) until said difference data associated with said at least one set of I and Q signals is less than a threshold difference level (see 114 loops back to 106 in Fig. 6, also see claim 5). Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to incorporate the method of Smee into the method of Ginis in view of Timm, so as to compensate channel or system variations and thereby to improve performance of the precoded communications system.

Regarding claim 15, Smee teaches that said data indicative of differences between transmitted and received signals comprises mean square error data (col. 5, line 33).

Regarding claims 16 and 17, as explained above in claim 14, the signal used in the DSL system may be a CAP signal or a QAM signal.

Allowable Subject Matter

14. Claims 7 and 18 would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims and overcome the rejections under 35 USC 112, second Paragraph above.

Conclusion

15. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Schneider et al. (U.S. Patent No. 6,680,978).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chieh M Fan whose telephone number is (571) 272-3042. The examiner can normally be reached on Monday-Friday 8:00AM-5:30PM, Alternate Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Chin can be reached on (571) 272-3056. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Art Unit: 2634

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Chieh M Fan
Primary Examiner
Art Unit 2634

March 20, 2005